

**BARBERRY CARPET MOTH, *PAREULYPE BERBERATA* D. & S.:
THE DISCOVERY OF A SECOND BREEDING COLONY IN BRITAIN
AND OTHER RECENT RECORDS.**

P. WARING

Joint Nature Conservation Committee, Monkstone House, Peterborough PE1 1JY.

THIS PAPER reports the discovery of three larvae of *P. berberata* at Westonbirt Arboretum in Gloucestershire on 12th September 1988 and a further three on a return visit on 30th June 1989, feeding not on the usual native barberry, *Berberis vulgaris*, but on a *Berberis* which the arboretum dendrologist, John White, has not been able to determine precisely, because it is probably a hybrid or cultivated variety. The best estimate is *B. turcomanica* possibly var. *integerrima*. The background to the discovery and the implications for the status and conservation of the moth in Britain are given below.

Background information

In 1969 a colony of *P. berberata* was discovered near Winchester, Hants in a locality in which a single individual was recorded in 1940 (Goater, 1974). During the 1970s the three bushes of *B. vulgaris* on which larvae were found were scorched by uncontrolled stubble burning (Skinner, 1984, 1987). The bushes subsequently recovered but the moth has not been seen there again in spite of a number of searches by concerned entomologists (B. Skinner pers. comm.). Since then only a single breeding colony of this moth has been known in Britain. This is the traditional site in Suffolk which consists of just 120m³ of hedgerow barberry, *Berberis vulgaris*, the native foodplant of *P. berberata* (Waring, 1989). Formerly the moth was not so rare. In the nineteenth century *P. berberata* was widespread in England and Wales (Jenner-Fust, 1868). It reached at least as far north as Marr near Doncaster, Yorks (Porritt, 1883). The discovery that *B. vulgaris* was a secondary host for the wheat rust fungus *Puccinia graminis*, led to farmers grubbing out the plant from hedgerows and the loss of colonies of the moth (Barrett, 1902).

Recent records of *P. berberata*

In spite of this destruction of habitat, occasional adult specimens of *P. berberata* have been reported in recent decades from widely scattered localities.

Skinner (1984) notes single specimens from Blandford, Dorset on 23rd May 1926, Bourton-on-the-Water, Gloucestershire on 15th May 1949 and 25th July 1952, Westonbirt, Gloucestershire on 8th September 1962 (reported by Newton 1963) and several mostly worn examples near Ifold, West Sussex on 4th and 5th June 1969, the latter report also appearing in Pratt (1981). Recent records which have been collated subsequently include

a singleton from Slapton, Devon on 13th June 1959 (Richardson, 1960), two specimens, on 4th June and 19th August 1979, and a third on 31st May 1981, at Faringdon, Oxfordshire (M.F.V. Corley, pers. comm.), and further single specimens from Westonbirt, Gloucestershire on 25th August 1974 and 8th June 1980 (Rothamsted Insect Survey files) and in June 1980 (no day given) (Newton and Meredith 1984), a specimen from Crawley, Hampshire on 30th August 1984 (R.A. Bell, pers. comm.) and this year (1990) a single female from a second locality near Winchester, Hampshire from which site there are no previous records. There are also records which require investigation from Dyfed (1962) and Bedfordshire (1969-1971) on NCC files and examination of the local lists catalogued by Chalmers-Hunt (1989) may turn up additional records.

Previous searches for breeding colonies based on the above records

Location of the breeding colonies from which specimens like the above have come is not necessarily an easy matter and can be time consuming. Jack Newton (pers. comm.) described to me how he searched the Westonbirt area "a couple of years" after capturing the 1962 specimen reported in Newton (1963). The arboretum was "like a jungle in places" and he had difficulty in locating the barberry bushes. Consequently none was beaten and he has found no larvae in the intervening years nor knows of any through his work as county recorder for Gloucestershire. When Martin Corley (pers. comm.) went on 4th May 1988 to check the nearest *B. vulgaris* known to him at the site where he recorded his specimens in Oxfordshire in 1979 and 1981, he found that the *Berberis* had been removed during hedge tidying and ditch maintenance. In Sussex Pat Cordell was unable to locate any *B. vulgaris* in the vicinity of his captures and according to the "local Floras" the plant does not occur in this part of Sussex nor the adjacent area in Surrey (B. Skinner, pers. comm.).

In view of my discovery of *P. berberata* on a cultivated *Berberis* rather than *B. vulgaris* it may be that the Sussex specimens and others have come from colonies that are now feeding on exotic *Berberis* species which do not appear in the county Floras.

The search at Westonbirt

During 1988 and 1989, the Nature Conservancy Council moth conservation project (Waring, 1990a), provided the opportunity to investigate Westonbirt Arboretum. The site was visited four times in all. The first visit was made on 1st June 1988 by Paul Hatcher who was assisting with surveys for the moth in Oxfordshire, while I was working on the species in Suffolk.

Equipped with hand net and torch, he searched from dusk until 21.30 hours, mainly in the vicinity of two bushes of *B. vulgaris*. It was a cloudy night, drizzling, with no wind and other geometrid moths were seen, but no

Barberry Carpets. There was a blank result on the same night at the Suffolk colony.

On 4th June Rachel Thomas and I investigated Westonbirt Arboretum. We allowed a full day to walk around the site, and we needed it. There are 116 *Berberis* plants, of a variety of species, in the numerical listing for the site (FC computer file, 1988 version) and we set out to look at them all so that I could decide the places where we might be most likely to find the moth breeding if it was present. In this exercise we were greatly assisted by the Forestry Commission staff at Westonbirt who provided us with maps locating all the plants. To round off the day we set up a Robinson trap by some old established *Berberis* which had large fleshy leaves like *B. vulgaris* but which at that time had not been identified. We operated a Heath trap by other *Berberis* nearby and patrolled these and the area around the permanent Rothamsted trap until 23.00 hours. It was a cloudy calm night with a dusk temperature of 12°C which had dropped to 8°C by the time we packed up. We noted five other species of geometrid moths on the wing but no *P. berberata*. Possibly the flight period of *P. berberata* had ended by this time.

Owing to other survey commitments the next visit was on 12th September 1988, four days after finding second generation larvae in Suffolk. Paul Hatcher and I started beating at exactly the place where I had operated the Robinson trap in the arboretum on 4th June and immediately we got three larvae from these undetermined *Berberis*. All three larvae were in the final instar, just as in Suffolk. Two were returned to the bushes and one was retained to be photographed and reared to adult for absolute confirmation of this record. It began to spin its cocoon on 18th September 1988. We left these bushes well alone as soon as we had established that larvae were present, and moved on to try elsewhere in the arboretum. In spite of beating a total of 90m³ of *Berberis* at several other locations which I had considered promising within the arboretum, we found no more larvae. Two possible explanations for this result are that the larvae are very localised within the arboretum or that we just caught the last tail-enders before pupation. For comparison note that on the previous day, 11th September 1988, 95% of a batch of 70 captive larvae reared at outdoor temperatures were fully fed and some had begun to spin cocoons (R. Eley, pers. comm.) and most of another batch kept in a garden shed had pupated (G. Haggett, pers. comm.).

On 30th June 1989 I returned to Westonbirt in the company of Ron Louch. We were successful in finding three part grown larvae almost immediately when beating the same bushes that had produced larvae the previous September, but we found no more larvae on any of the bushes elsewhere in the arboretum. All three larvae were returned to the bushes from which they came and we did not disturb these again. *Berberis* species were beaten in all parts of the arboretum and we covered as much as we could reach from the ground. There are some very large bushes — one is

over 5m tall — and inevitably some *Berberis* foliage could not be beaten, but at this stage the moth must be considered as having a very local distribution within the arboretum and the individual bushes on which the larvae were found must be conserved even though there are similar bushes elsewhere on the site.

The discovery at Westonbirt is important for several reasons. It is only the second colony of the Barberry Carpet known to exist in Britain at present. It is far removed from the Suffolk colony and gives hope that the moth could still survive elsewhere within the large area of southern and midland England that it occupied in the nineteenth century. It is the first time that the moth has been recorded on a *Berberis* hybrid or cultivar rather than on the native *Berberis vulgaris* and this opens up the possibility that other colonies could exist on introduced *Berberis*. The host plant at Westonbirt is similar to *B. vulgaris* in having fairly large fleshy leaves and a relatively thin cuticle in comparison with many *Berberis*. This type of foliage is probably more palatable to the early instars. From captive rearing it has already been established that the larvae will develop successfully on some of the exotic *Berberis* species such as *B. ottawensis*, *B. thunbergii* and *B. wilsoniae*. It would be useful to rear the same number of larvae on several of the more common *Berberis* species and compare their growth rates. What is clear now from the discovery at Westonbirt is that the female will lay in the wild on at least one of the *Berberis* species or hybrids other than pure *B. vulgaris*.

In these circumstances there is a final point which may help explain why the Barberry Carpet survives at Westonbirt but appears to be absent elsewhere and that is the continuity of the habitat. The arboretum records show that *Berberis vulgaris* has been represented on the site since well before 1927. In that year Jackson (1927) reports "There are exceptionally fine plants of this well-known shrub at Westonbirt, one in Silkwood at the west end of the Broad Drive is no less than 18 ft high, 22 ft through and 40 ft in circumference." No planting date is given but the specimen must have been there for several decades to attain such a size. This would take us back to some time in the previous century, perhaps before the large-scale eradication of barberry and certainly when the moth was a commoner insect in the countryside. There are no earlier written records confirming the presence of *Berberis vulgaris* on the site. The curator Jonah Neale left a diary for 1858 which mentions some of the plants in the arboretum but which is known not to be comprehensive. *Berberis vulgaris* is not mentioned. The arboretum was started in an open field with adjacent woodland by Robert Holford in 1829. The present arboretum dendrologist (John White, pers. comm.) informs me that it was Holford's aim to represent all the native British trees and shrubs in his collection. As *Berberis vulgaris* was then not an uncommon species and well-known, with culinary and herbal uses (Bean, 1970), it is very likely that Holford would

have obtained it. So, while the Barberry Carpet has been recorded intermittently at Westonbirt since 1962, it may well have been on the site for very much longer. It is fortunate in that its habitat requirements have continued to be met on a site that has undoubtedly changed a great deal even since 1962. The Forestry Commission now own the site and I alerted them and our regional staff to the presence of the moth as soon as we discovered it. I have drawn attention to the fact that the use of insecticidal sprays in the vicinity of the *Berberis* may jeopardise the moth and that the removal of leaf litter from under the bushes may remove pupation sites for it. Captive rearing experiments suggest the larvae prefer to pupate at the soil surface just below leaf litter but raking away the dead leaves may expose the pupae to predators.

In view of the discoveries reported above it would be well worth investigating large stands of long-established *Berberis* in other parts of Britain. *B. vulgaris* is widespread, although considered to be introduced in many places (Perring and Walters, 1990). Even where the plant is introduced, it is conceivable that eggs and larvae may have accompanied the bushes if these were transplanted in leaf many years ago. The Juniper Carpet, *Thera juniperata*, has been widely introduced in this way in recent years (Waring, 1990b).

On the question of beating unexplored *Berberis* sites.

In view of the apparent rarity of *P. berberata* and continuing threats to the traditional breeding site (Waring, 1989), the species was given the full protection of the Wildlife and Countryside Act 1981, Schedule 5, in 1981. This makes it illegal to collect or disturb the species in any of its stages without a licence issued by English Nature or the Countryside Commission for Wales or to trade in it without a licence issued by the Department of the Environment (DoE). There is a maximum fine of £2,000 per specimen for any deliberate infringement. Consequently deliberately setting a trap or beating a barberry bush for the species, such as at a known breeding site, is illegal. However, it is unlikely that any court would consider it an offence if an entomologist accidentally caught a specimen at a light trap away from the known breeding sites. In this event statutory bodies would not seek a prosecution and would be most grateful for details of the record (Species Adviser, M.A. Palmer, JNCC, pers. comm.).

Deliberate beating of *Berberis* in search of the larvae needs to be covered by a licence. This can be arranged for *bona fide* surveys and, in view of the great value of these in clarifying the true status of *P. berberata* in Britain, applications will be considered favourably. I am happy to be the initial JNCC contact and would welcome and assist any proposals for survey work. JNCC may also be able to assist in obtaining permission from owners for surveys on private land.

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